DEVELOPING A REGIONAL APPROACH TO STORM WATER MANAGEMENT IN THE 30TH STREET INDUSTRIAL CORRIDOR

CITY OF MILWAUKEE DEPARTMENT OF CITY DEVELOPMENT

City of Milwaukee

INTRODUCTION Under natural conditions, most of the water that falls on earth is taken up by plants, evaporates into the air, or seeps into the soil and becomes groundwater. Water that does not evaporate or infiltrate into the ground is called runoff. As a watershed develops, natural areas are converted into fields, lawns, rooftops, roads, and parking lots, which reduce the amount of land available for the natural evaporation or infiltration of water into the ground. Water that falls on these surfaces quickly flows to our streams through the storm water drainage and sewer system. This urban condition contributes to the degradation of our water resources in a number of ways including the movement of pollutants from the urban landscape into our surface and ground water resources.

Non-point source pollutants such as oil and grease, road salt, eroding soil and sediment, metals, bacteria from pet wastes, and excess nitrogen and phosphorus from fertilizers are washed from streets, buildings, parking lots, construction sites, lawns and golf courses into streams and lakes. This pollution, which comes from everywhere on the land rather than from a specific point, reduces the quality of our streams for aquatic life, as well as for human uses such as fishing, swimming, and bird watching. These pollutants accumulate as the water flows downstream and eventually begin to degrade the quality of Lake Michigan for similar and other uses. In this way, every small bit of pollution adds up to a very large problem. Due to these negative impacts on water quality, the State of Wisconsin has mandated that the cities in Wisconsin reduce the amount of sediment in storm water runoff by 40% by 2013. This brochure is a summary of a City of Milwaukee and State of Wisconsin project to examine strategies to help the City achieve that goal.

Project Area, Context and Goals

The State of Wisconsin and the City of Milwaukee are partnering to study ways to reduce the flow of pollutants from the land surfaces within the northern portion of the 30th Street Industrial Corridor to meet new state water quality standards while improving the corridor and the surrounding neighborhood. The 450 acre study area is located in north central Milwaukee and is bounded by West Hampton Avenue on the north, North 35th Street on the west, North 27th Street on the east, and West Concordia Avenue and West Townsend Street on the south. The area consists primarily of industrial (manufacturing, construction, and warehousing) and single family residential land uses.

The 30th Street Industrial Corridor has been targeted for reinvestment and revitalization by the City using economic development tools to attract and retain businesses and create new jobs. The City recognizes, however, that continuing to use conventional development and storm water management practices during this redevelopment effort will result in continued degradation of water resources. A new trajectory that incorporates proven and environmentally-friendly storm water and landscape management practices within the right-of-way, on underutilized land, and in other areas where the landscape can be modified to include these practices. This 'greening' of the corridor also serves as an economic development strategy to encourage private sector investment and to attract and retain businesses and bring jobs to the area, some of which may themselves focus on green products or services.

This project examines Milwaukee's storm water management policies and programs, develops ideas for incorporating innovative storm water management practices into sites within the 30th Street Industrial Corridor, and examines the cost and performance implications of doing so. The project is being directed by an Advisory Committee consisting of stakeholders and representatives from: the City of Milwaukee Departments of City Development, Public Works, and Administration; Milwaukee Metropolitan Sewerage District; the U.S. Environmental Protection Agency Region 5; Wisconsin Department of Natural Resources; 30th Street Industrial Corridor Corporation; Milwaukee Riverkeeper; Menomonee Valley Partners; Groundwork Milwaukee; University of Wisconsin–Extension; and Center for Resilient Cities.

Funding for this project is provided by an Urban Nonpoint Source & Storm Water Planning Grant from the Wisconsin Department of Natural Resources in combination with local matching funds.

Water quality basins, such as this concept for the Ruby Yard site, are highly effective at reducing runoff pollution and can be designed as neighborhood amenities.

Storm Water Management Strategies

Communities across the country have taken a variety of approaches and measures to improve the management of water resources through improved storm water management practices. Strategies range from purely regulatory approaches, which require development to meet specific standards, to providing incentives and education to encourage a change in behavior.

- Storm water ordinances can control both the quality and quantity of storm water runoff from the developed landscape.
- A storm water utility fee is a charge levied to landowners to help pay the cost of installing and operating a community storm water management system. A number of communities allow landowners to reduce the utility fee in exchange for installing storm water management practices to reduce the rate, volume, or pollution levels of storm water runoff.
- Funding and financing programs include grants, loans, tax incentives, Tax Increment Districts, Target Investment Districts, Business Improvement Districts, and other tools that provide an economic incentive to implement storm water management practices.
- Municipalities and other organizations can provide technical and financial assistance to landowners to encourage changes in behavior, to fund storm water management practices, or to provide assistance in the form of websites, 'how-to' manuals, brochures, and other publications.
- The city can implement storm water management projects as part of capital improvements on public land. This may include projects in the public right-of-way (streets, sidewalks, alleys, medians, and parkways), rooftops of public buildings, public parking lots, schools, and parks.
- Education, outreach, and technical training and assistance are a critical part of any campaign to raise awareness, change behavior, build technical capacity, and implement new storm water management practices. These include websites, workshops, tours, and participatory events.

A storm water demonstration park, such as this concept for a site at 4101 N. 31st Street, can exhibit ways to filter and infiltrate runoff using landscaping and permeable pavement.

Parking lots, a significant source of runoff pollution, can be redesigned with permeable pavement and vegetated bioinfiltration areas to absorb and treat runoff, as in this concept for the Eaton Corporation.

City of Milwaukee Projects and Programs

The City of Milwaukee and its partners have made great strides in efforts to manage storm water wisely, from regulatory approaches to programs and demonstration projects.

- The City currently charges landowners a storm water utility fee that helps to defray the cost of construction, maintenance, and operation of the storm water management system. The City allows some landowners to reduce this fee by up to 60% under certain circumstances.
- The City Department of Public Works has installed storm water bioinfiltration features into the public right-of-way (parkways and medians) along 27th Street, 91st Street, Grange Avenue, and 9th Street.
- The Menomonee Valley Storm Water Park is a 15-acre, regional scale green infrastructure facility designed to detain flood water and remove 80% of sediment from storm water runoff from an adjacent 60-acre industrial manufacturing center.
- Under the City's green roof program, a green roof has been installed on the city owned building at 809 North Broadway, which was partially funded with Milwaukee Metropolitan Sewerage District grant funding.
- The City of Milwaukee Forestry Department has partnered with Milwaukee Public Schools to institute a Green Schools program that uses federal grant money to replace asphalt with grass and trees. The program now includes 15 schools.
- The Milwaukee Metropolitan Sewerage District provides direct grant assistance for implementing storm water best management practices. Green roofs, permeable parking lots, rain gardens, and wetland detention basins have all been partially funded using MMSD grant funds.

Public and Private Capital Projects

In discussing possible approaches to improving storm water management efforts, the Advisory Committee prioritized strategies that have the potential to directly improve water quality in the near term through capital improvements on public and private property. Three public and three private sites were identified within the 30th Street Industrial Corridor where storm water management practices could be implemented and would help foster redevelopment and private investment. Following identification of the sites, concept plans were developed using a variety of storm water management practices and the performance and cost of each site concept were estimated. Since a large proportion of the corridor and a significant component of the pollutant load come from street rights-of-way and adjacent tributary land areas, this study also examined strategies for addressing runoff within the area of the right-of-way for residential streets and alleys. Concepts for the six public and private sites, as well as the public right-of-way, are described below. More detailed descriptions and illustrations can be found in the full report.

The following green infrastructure and storm water management practices were the primary strategies used for the site concepts.

Permeable pavers have a perforated surface that allows rainwater runoff to flow into an underlying layer of stone. As rainfall runoff passes through the permeable pavers and stone, sediment and associated pollutants common in urban runoff are filtered and treated. Permeable paver location opportunities include alleys, roadways, and parking lots. Permeable pavers have additional benefits over conventional pavement including: reduced ice formation in winter, greater durability and longer replacement cycles, and the ability to remove and replace pavers to repair and maintain subsurface utilities.

Bioinfiltration areas are vegetated zones with highly permeable soils and a layer of stone. Rainwater runoff from adjacent impermeable streets and parking lots enters the bioinfiltration areas where soils filter the rainwater runoff and vegetation can absorb some of the pollutants. Bioinfiltration can be installed in and along streets and in landscape areas adjacent to impervious surfaces such as parking lots.

Natural landscaping uses plants that are tolerant of urban conditions and typically have deep root systems. If properly designed these landscaping areas can provide a storm water management benefit, be aesthetically pleasing, create green space, and improve biodiversity in urban areas. Natural landscapes can be installed in almost any area where turf grass or more ornamental vegetation exists, but they require different management than turf grass.

Green roofs have a layer of highly permeable growing media that absorbs and filters rainfall. A variety of green roof types can be applied to nearly any rooftop, depending on the structure and roof drainage characteristics.

Public Sites

1. A new naturalized storm water retention basin at Ruby Yard (3020 West Congress) could capture and treat runoff from residential areas to the east and reduce sediment loads by up to 94%. This retention basin could be designed as a neighborhood amenity, with a walking path, seating areas, and naturalized plantings.
2. The North 30th Street Parkways, between Congress Street and Eaton Corporation, could be converted from turf grass to bioretention areas with natural plantings. Treatment of runoff from residential areas to the east could reduce sediment loads by up to 78%.
3. 4101/4131 North 31st Street could be converted from vacant land to parking for DRS Corporation and a storm water demonstration park with seating areas, natural landscapes, bioinfiltration, and educational signage about sustainable storm water management applications. Green infrastructure practices on this site could reduce sediment loads from runoff by up to 96%.

Private Sites

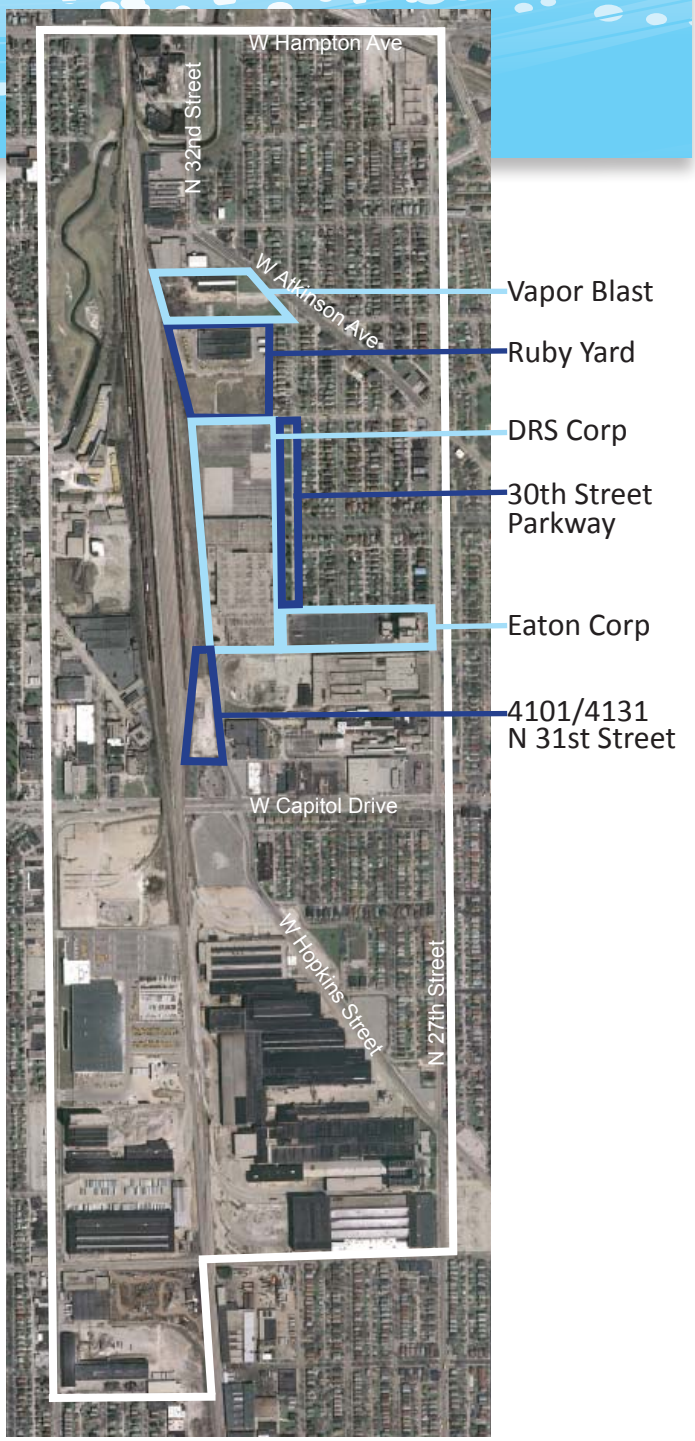
1. DRS Technologies Inc. (4265 North 30th Street) could retrofit the existing parking lot with bioretention and/or permeable paving, which could reduce sediment loads by up to 82%. The addition of a green roof on the building could reduce sediment loads by up to 90%.
2. Eaton Corporation (4201 North 27th Street) could retrofit the existing parking lot with bioretention and/or permeable paving, with the potential to reduce sediment loads by up to 90%, while the addition of a green roof could increase this figure to up to 92%.
3. Vapor Blast Manufacturing Company (3025 West Atkinson Avenue) could naturalize its existing turf grass landscape and convert its parking lot to include permeable paving and/or bioswales, reducing sediment loads by up to 96%.

Right-Of-Ways

Residential streets can be modified to include bioretention areas at corners and at the middle of the block. Permeable pavement can also be used within the street, either for the entire width or just within the parking lanes. Similarly, alleys can be reconstructed to include permeable paving rather than conventional asphalt or concrete. These practices can reduce sediment loads from residential street rights-of-way by up to 57% and in residential alleys by up to 33%.

Corridor Evaluation

In addition to the evaluation of the individual sites, this project also evaluated the potential corridor wide performance of implementing green infrastructure strategies. The corridor wide performance depends on the proportion of the corridor to which the various storm water practices would be applied. To achieve a minimum corridor wide performance level of 40% required by the State of Wisconsin, the practices would need to be applied to approximately 65% of the corridor, which would be both physically and financially challenging.



30th Street Industrial Corridor project locations.

Conclusions

It is clear that the storm water management practices examined during this study have the potential to significantly reduce sediment loading and improve water quality. Although these practices will impose a significant cost, the green infrastructure practices presented here provide additional benefits beyond improving the quality and reducing the quantity of storm water runoff. These include beautification and greening of the urban landscape, durability and longevity of paved surfaces, and durability and longevity of roof surfaces. As the City of Milwaukee continues to look for opportunities to integrate green infrastructure into the urban environment, it will consider the long term costs and benefits of these practices in an effort to improve the quality of life for its residents.